Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
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Modernizing the E-rate Program for Schools and Libraries	))	WC Docket No. 13-184
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COMMENTS OF NEW AMERICA FOUNDATION'S OPEN TECHNOLOGY INSTITUTE AND EDUCATION POLICY PROGRAM

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Executive Summary

Last fall, New America's Open Technology Institute and Education Policy Program outlined a series of priorities for E-rate reform based on the idea that the program should be updated to better support libraries and schools in their roles as hubs for connected communities. In these comments, we focus on two areas consistent with our previously established priorities: funding high-speed connectivity both to and within schools and libraries, and improving data collection and transparency.

To address both external and internal connectivity constraints, we recommend that the Commission (1) create a dedicated, one-time Upgrade Fund to help schools and libraries invest in significant infrastructure upgrades that will support gigabit speeds and beyond, and (2) restructure the existing priority system to increase the availability of funding for internal connections equipment that will help connectivity spread within institutional walls. We believe that the $2 billion the Commission recently identified should be dedicated primarily toward addressing immediate infrastructure needs through the Upgrade Fund. Once an Upgrade Fund has been created, the Commission should consider moving certain services from Priority 2 to Priority 1 to better support internal connections, as well as to address related privacy and security issues.

Better data collection practices and greater transparency are also critical to the success of a modernized E-rate. Improvements in this area will produce more useful data that can be analyzed by the Commission, researchers, and the public (including the applicant community) to more clearly understand how E-rate money is being spent and what services and equipment schools and libraries are getting through this support. We therefore urge the Commission to

improve its data collection practices and application process, particularly with regard to information about speeds and prices.

I. Introduction

The need to upgrade America's Internet infrastructure to support innovative digital learning tools and services has never been greater. The majority of schools and libraries across the country report that they lack the capacity to meet current needs, while parents believe that their children are unprepared to compete for 21st century jobs on a global scale in large part due to poor technology infrastructure.[1] This is why serious improvements to the Federal Communications Commission's (Commission) E-rate program are so critical. Former Commission Chairman Reed Hundt recently referred to E-rate as the "single largest investment in schools and libraries since the GI Bill," calling for the program to be modernized in a manner that meets the changing needs of schools and libraries today with an eye on lessons from the program's history two-decade history.[2] Current Chairman Tom Wheeler also highlighted the urgency of E-rate reform in a speech last month, emphasizing that, "Technology has changed; the needs of schools have changed; the E-rate program must reflect this change."[3]

Last fall, New America's Open Technology Institute[4] and Education Policy Program[5] outlined a series of priorities for E-rate reform based on the idea that the program should be

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[1] Lucija Millonig, "Most U.S. Adults Give Schools a 'C' or Below for Tech. Access, Survey Finds," *Education Week*, February 4, 2014, http://blogs.edweek.org/edweek/DigitalEducation/2014/02/most_us_adults_give_schools_c_or_below_for_tech_access_survey_finds.html.

[2] A paraphrased summary of Chairman Hundt's remarks can be found in Susan Hildreth, "Connected Communities in An Age of Digital Learning," *Up Next: The Official Blog of the Institute for Museum and Library Services*, March 4, 2014, http://blog.imls.gov/?p=4650.

[3] Remarks of Tom Wheeler, Chairman of the Federal Communications Commission, at the Council of the Chief State School Officers Legislative Conference, March 17, 2014, available at https://www.fcc.gov/document/chairman-wheeler-remarks-ccsso-legislative-conference.

[4] The Open Technology Institute formulates policy and regulatory reforms to support open architectures and open source innovations and facilitates the development and implementation of open technologies and communications networks. OTI promotes affordable, universal, and ubiquitous communications networks through partnerships with communities, researchers,

updated to better support libraries and schools in their roles as hubs for connected communities.[6]

We focused our recommendations on four key areas: (1) E-rate should encourage investment in better infrastructure that is capable of both providing robust connectivity now and scaling to meet future needs; (2) schools and libraries should have the flexibility to leverage this infrastructure to spread connectivity beyond their walls to the surrounding communities; (3) the Commission should improve data collection and measurement tools so that E-rate participants, researchers, and policymakers can better understand and analyze the program going forward; and (4) the Commission must address gaps in E-rate that may unintentionally lead to inequities in different geographical areas or among different types of institutions.

In recent months, we have been encouraged that both the Commission and the Administration more broadly have continued to focus energy on E-rate reform, pushing for ambitious efforts to connect schools and libraries to high-speed networks and announcing a

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industry, and public interest groups and is committed to maximizing the potentials of innovative open technologies by studying their social and economic impacts – particularly for poor, rural, and other underserved constituencies. OTI provides in-depth, objective research, analysis, and findings for policy decision-makers and the general public.

[5] The Education Policy Program uses original research and policy analysis to solve the nation's critical education problems, serving as a trusted source of objective analysis and innovative ideas for policymakers, educators, and the public at large. The Education Policy Program uses original research and policy analysis to solve the nation's critical education problems, serving as a trusted source of objective analysis and innovative ideas for policymakers, educators, and the public at large. Our work encompasses the full range of educational opportunities, from early learning to primary and secondary education, college, and the workforce. We are deeply engaged in ongoing developments in educational technology at all levels of child and adult development. We believe new organizational models have potential to achieve breakthrough levels of performance on behalf of students. And we believe that all providers of education must be held constructively accountable for the quality of their work.

[6] *See* Comments of New America Foundation's Open Technology Institute and Education Policy Program, WC Docket No. 13-184 (September 16, 2013) (NAF Initial Comments); Reply Comments of New America Foundation's Open Technology Institute and Education Policy Program, WC Docket No. 13-184 (November 8, 2013) (NAF Reply Comments). *See also* Danielle Kehl, Sarah Morris, and Lindsey Tepe, "Connected Communities in an Age of Digital Learning: A Vision for a 21st Century E-rate Program," New America Foundation, February 26, 2014, http://oti.newamerica.net/sites/newamerica.net/files/policydocs/ERate_Brief_NAF.pdf.

series of public-private partnerships aimed at supplementing that connectivity.[7] In the comments below we focus on two areas consistent with our previously established priorities in the proceeding: funding high-speed connectivity both to and within schools and libraries, and improving data collection and transparency.

II. The Commission should ensure that schools and libraries have high-speed connectivity to the premises and sufficient internal connections to support 21st century digital learning environments.

In the recent Public Notice, the Commission focuses on how to most effectively improve the existing E-rate program to connect schools and libraries to high-speed Internet access.[8] We commend the Commission for recognizing that schools and libraries face both external and internal connectivity constraints, and we recommend that the Commission take the following approach to modernizing E-rate: create a dedicated, one-time Upgrade Fund to help schools and libraries invest in significant infrastructure upgrades that will support gigabit speeds and beyond, and restructure the existing priority system to increase the availability of funding for internal connections equipment that will help connectivity spread within institutional walls. While we agree with those who suggest that the E-rate program will likely ultimately need more funding,[9]

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[7] Danielle Kehl, "Connectivity in the Classroom: What's the Word on E-rate and ConnectED?" *New America Ed Central*, February 5, 2014, http://www.edcentral.org/whats_the_word_on_e-rate/. *See also* Maggie Severns, "Big Tech Putting 'Down Payment' on Connecting Schools," *Politico Magazine*, February 4, 2014, http://www.politico.com/story/2014/02/big-tech-companies-schools-internet-103068.html; David Hudson, "Making Progress on ConnectED," The White House Blog, February 4, 2014, http://www.whitehouse.gov/blog/2014/02/04/making-progress-connected; Trent Harkrader, "From the Wall to the Desk: Facilitating 21st Century Digital Learning," Federal Communications Commission, February 20, 2014, https://www.fcc.gov/blog/wall-desk-facilitating-21st-century-digital-learning.
[8] *Wireline Competition Bureau Seeks Focused Comment on E-rate Modernization*, WC Docket No. 13-184, Public Notice (March 6, 2014) (E-rate Public Notice).
[9] *See*, e.g. Reply Comments of the SHLB Coalition, WC Docket No. 13-184 (November 8, 2013) at 2.

we believe that the $2 billion the Commission recently identified is a meaningful first step and should be dedicated primarily toward addressing immediate infrastructure needs through the Upgrade Fund. Once an Upgrade Fund has been created, the Commission should consider moving certain services from Priority 2 to Priority 1 to better support internal connections, as well as to address related privacy and security issues.

A. A modernized E-rate should focus on providing gigabit capacity and high-speed internal connections to all schools and libraries.

As the Commission notes, schools and libraries face two separate but related connectivity challenges: deploying robust, scalable, high-speed connectivity *to* schools and libraries across the country, and ensuring that there is sufficient LAN and Wi-Fi capacity in those buildings to support students, teachers, and patrons using a range of different technologies and individual devices.[10] While upgrading internal connections is critically important, if it is not built upon a foundation of high-capacity connectivity to the premises, then the benefits of connecting every classroom and room in a library will be limited. Consequently, the Upgrade Fund should be designed to focus first on the issue of connecting schools and libraries to high-speed networks, and specifically on incentivizing fiber builds that are scalable and can lead to long-term cost savings. Once they have higher-capacity future-proof infrastructure in place, schools and libraries can focus on upgrading existing internal connections and equipment within the buildings to ensure that their networks are optimized for that capacity and are able to meet the needs of their users. The Commission's proposal to move some services from Priority 2 to Priority 1 to better support internal connections makes sense in this regard, recognizing that internal connections are an important investment but that much of the equipment will need to be

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[10] E-rate Public Notice ¶6-8.

replaced or upgraded in the next few years.[11] In short, we argue that the new Upgrade Fund should focus on the large, upfront investments in fiber infrastructure that schools and libraries will need for high-capacity connectivity now and in the future, and that the Commission should concurrently place greater emphasis on internal connections in existing parts of the E-rate program through rules that better address the nature of the technology and types of requests.

Some commenters and critics have questioned whether the Commission's proposed high-speed goals for schools and libraries are actually necessary.[12] While there may not be a one-size-fits-all solution for every institution that receives E-rate support, that does not mean the Commission should ignore the need to set targets for baseline levels of connectivity, especially as schools and libraries are encouraged to take advantage of the Upgrade Fund to invest in high-capacity, scalable infrastructure. Even if schools and libraries do not currently feel that existing connectivity is insufficient, it is clear that capacity constraints will become a problem in the immediate future.[13] Concerns about schools and libraries ending up with significant "unused" capacity are therefore largely misplaced. Indeed, there is ample evidence that suggests that scalable high-speed connectivity is no longer optional but will be essential going forward. High capacity broadband is a key prerequisite for all schools in states adopting the online assessments aligned with the Common Core State Standards, which are currently being piloted and will be

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[11] E-rate Public Notice ¶10.

[12] *See*, e.g. Comments of the National Cable and Telecommunications Association, WC Docket No. 13-184 (September 16, 2013) at 2, 7.

[13] *See* Kristen Purcell, Alan Heaps, Judy Buchanan, and Linda Friedrich, "How Teachers Are Using Technology at Home and In Their Classrooms," Pew Research Internet Project, February 28, 2013, http://www.pewinternet.org/2013/02/28/how-teachers-are-using-technology-at-home-and-in-their-classrooms/ (Pew Study). *See also* "2010 E-rate Program and Broadband Usage Survey: Report," Federal Communications Commission Wireless Competition Bureau, January 2011, http://transition.fcc.gov/010511_Eratereport.pdf (E-rate Usage Survey).

rolled out statewide next year.[14] More broadly, high-speed access is critical as many states plan

to transition to widespread classroom use of digital resources and e-textbooks in the next few

years. Libraries also require robust connectivity, especially as they increasingly serve as hubs for

the millions of adult Americans who do not have home broadband access but who need to use

the Internet to access everything from essential government services to online courses.[15] All over

the country, however, these institutions report that current bandwidth is insufficient to meet the

basic needs of students, teachers, and library patrons.[16]

In January 2014, for example, the *Detroit News* reported that a number of elementary

school students taking an online assessment were forced to retake exams after their computers

crashed in the middle of the test because of insufficient bandwidth.[17] District officials reported

that their students were being held back by aging technology and that schools which did not meet

the minimum bandwidth requirements for online testing would be required to limit the number of

students that could be tested at a single time, creating scheduling challenges and additional

resource strains. Similarly, as recently as July 2013, 75 percent of schools in New York City

reported maximum Internet speeds of 10 Mbps, and depending on the time of day and number of

users on the network, most would not be able to offer speeds above 4 Mbps. Such speeds barely

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[14] Sean Cavanagh, "Districts Look to E-rate Program to Help With Common Core Tech Costs,"
Education Week, January 15, 2013, http://www.edweek.org/ew/articles/2013/01/16/17e-rate.h32.html.
[15] Remarks of Former FCC Chairman Reed Hundt at the New America Foundation, February 27,
2014, 3:05-21:43,
http://education.newamerica.net/events/2014/connected_communities_in_digital_learning_age
(Remarks of Chairman Hundt at NAF).
[16] *See* Pew Study; E-rate Usage Survey. *See also* Liana Heitin, "Field Testing of Common Core
Exams Gets Off to Shaky Start at Md. High School," *Education Week*, April 3, 2014,
http://blogs.edweek.org/edweek/curriculum/2014/04/field_testing_an_on-the-ground.html.
[17] Jennifer Chambers, "Some Michigan schools districts not ready for shift to online tests,"
Detroit News, January 28, 2014,
http://www.detroitnews.com/article/20140128/SCHOOLS/301280025.

meet the Commission's definition of broadband from 2010 for residential users,[18] and only

somewhat adequately provide the base level of connectivity needed for a single user to watch

video lectures and use other multimedia online learning tools.[19] All three examples highlight how

limited bandwidth can make it difficult or even impossible for schools to meet new standards for

online testing. Research indicates that only about one-third of schools in the United States are

adequately connected to administer online testing right now.[20] Because many of the schools that

are already prepared are among this country's most affluent, a lack of infrastructure investment

through E-rate could therefore greatly exacerbate challenges that exist in under-resourced

communities.

In addition to meeting the capacity demands related to standardized testing, high-speed

Internet access is also critical for both schools and libraries to successfully increase their reliance

on, or switch over completely to, using digital resources and tools. States are beginning to

require that schools supplement or replace existing print resources with digital textbooks and

other online learning materials. Florida was among the first to mandate that its public schools

transition from traditional textbooks and hardcopy resources to digital learning tools, setting a

deadline of fall 2015 for half of all schools to implement digital instruction in the classroom.[21]

Similarly, North Carolina passed a law in December 2013 stipulating that it will fund only digital

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[18] Federal Communications Commission's Sixth Broadband Deployment Report, GN Docket No. 09-137 (July 16, 2010) at 8.

[19] Adam Forman, "Caution Ahead: Overdue Investments for New York's Aging Infrastructure," Center for an Urban Future, March 2014 at 32, http://nycfuture.org/research/publications/caution-ahead.

[20] Dan Weissmann, "Why the FCC Pays for Landlines But Not Broadband Internet," *American Marketplace*, February 4, 2014, http://www.marketplace.org/topics/business/education/why-fcc-pays-landlines-not-broadband-internet.

[21] "Classroom 2.0: Why Florida Schools Are Going Digital," *NPR State Impact,* n.d., http://stateimpact.npr.org/florida/tag/technology/.

textbooks starting in 2017.[22] New York City has also discussed the possibility of a transition to digital textbooks,[23] but given the current state of its broadband infrastructure, such a change would likely create significant challenges.[24] In addition to offering more opportunities for individualized instruction and up-to-date materials, digital resources can provide schools and libraries with long-term savings. In March 2012, estimates from the LEAD Commission, Project RED, and the Commission suggested that schools would save as much as $250 per student per year if they moved to digital textbooks.[25] The Commission's "Digital Textbook Playbook" further explains that "properly implemented technology can yield tangible savings,"[26] although the Commission smartly recognizes that these savings are neither immediate nor guaranteed— particularly because they may require infrastructure investments and equipment upgrades to obtain the necessary level of connectivity for digital resources to work.

In light of this evidence, we applaud the Commission for the steps it has already taken in the past year to advance E-rate modernization and to focus those efforts on high-speed connectivity. In the following sections, we reiterate and expand our past proposals for an

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[22] T. Keung Hul, "NC school districts must prepare for only digital textbooks by 2017," *News Observer*, December 16, 2013, http://www.newsobserver.com/2013/12/16/3465499/nc-school-districts-must-prepare.html.

[23] Beth Greenfield, "No Textbooks in NYC Schools: Coming Soon?" *Yahoo! Shine*, January 16, 2013, https://shine.yahoo.com/financially-fit/no-textbooks-nyc-schools-coming-soon-192700016.html.

[24] According to a 2013 report by the Manhattan Borough President's Office: "The low speeds in schools…effectively prevent New York City from fully integrating groundbreaking Internet-enabled learning into the educational experience of our young people." ("New York City's Digital Deficit: An Investigation of Slow Internet Speeds in Public Schools and Libraries," Office of the Manhattan Borough President, August 2013 at 5, http://www.scribd.com/doc/161686382/Scott-Stringer-Digital-Deficit-Report.)

[25] "Leaders to Discuss Transition to Digital Textbooks," LEAD Commission, March 29, 2012, http://www.leadcommission.org/news/leaders-discuss-transition-digital-textbooks.

[26] "Digital Textbook Playbook," Federal Communications Commission, February 1, 2012 at 11, http://transition.fcc.gov/files/Digital_Textbook_Playbook.pdf (FCC's Digital Textbook Playbook).

Upgrade Fund to help schools and libraries cover the upfront costs of deploying new broadband infrastructure. We also address questions about how to fund LAN and Wi-Fi connections in order to ensure that these institutions are able to make the most of the capacity they obtain.

B. The additional $2 billion the Commission has identified should primarily be used to start an Upgrade Fund that supports infrastructure investment.

In this Public Notice, the Commission seeks comments on how it should spend the additional $2 billion in E-rate funding that it identified[27] as being available over the next two years for high-speed Internet access, including what types of services and projects should be funded and the ways in which the Commission could measure impact.[28] We believe that the best use of these funds is to support the creation of an Upgrade Fund, which will enable schools and libraries to invest in one-time infrastructure upgrades, prioritizing robust and scalable fiber investments. Numerous commenters in the docket have explained that fiber is the most future-proof technology available for supporting high-capacity broadband.[29] Not only does fiber currently offer greater capacity than copper, but it is also better able to increase in capacity to meet future needs in a cost effective manner. EducationSuperHighway estimates that "without fiber, annual WAN connectivity costs will rise by 400% to meet schools' bandwidth needs, but that with fiber, such costs could drop by over 40%."[30] Although we believe the Commission

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[27] Edward Wyatt, "FCC Says It Will Double Spending on High-Speed Internet in Schools and Libraries," *New York Times*, February 1, 2014, http://www.nytimes.com/2014/02/02/us/fcc-says-it-will-double-spending-on-high-speed-internet-in-schools-and-libraries.html?_r=0.

[28] E-rate Public Notice ¶7, 24, 26 – 32.

[29] See, e.g. NAF Initial Comments at 4; Reply Comments of the Leading Education by Advancing Digital (LEAD) Commission, WC Docket No. 13-184 (November 8, 2013) at 9 (LEAD Reply Comments); Comments of Weslaco Independent School District, WC Docket No. 13-184 (September 16, 2013) at 3 (Weslaco Comments) Reply Comments of Google, WC Docket No. 13-184 (November 8, 2013) at 6 (Google Reply Comments).

[30] Reply Comments of EducationSuperHighway, WC Docket No. 13-184 (November 7, 2013) at 13 (EducationSuperHighway Reply Comments).

should also make changes to the E-rate program to ensure that there is adequate support for LAN and Wi-Fi connectivity, the Upgrade Fund should be dedicated primarily to supporting high-speed connections *to* schools and libraries. Doing so will help ensure that applicants do not prioritize equipment for internal connections in lieu of more immediate upgrades to institutional capacity, which would effectively favor short term gains over network investments that would lead to long term scalability and cost savings.

The Commission also seeks comment on what services it should fund and "how can it best ensure that the recurring costs associated with providing broadband over new connections is affordable for the applicants on a going-forward basis."[31] We believe that investing in fiber is a smart way to address future affordability challenges. A number of commenters, including schools and libraries themselves, have confirmed that fiber infrastructure is generally necessary to meet future capacity needs and speed targets, including those targets proposed by the Commission.[32] In fact, switching to fiber from copper or cable networks can significantly lower the per-megabit connectivity cost.[33] As Milo Medin, Vice President of Access Services for Google, has explained in reference to fiber networks, "[t]he cost of moving bits around keeps getting lower and lower because of technology driving improvements in capacity."[34] We recognize that there may be benefits to maintaining a technology-neutral approach to E-rate

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[31] E-rate Public Notice ¶26-27.
[32] *See*, e.g. Comments of South Dakota Department of Education & South Dakota Bureau of Information and Telecommunications, WC Docket No. 13-184 (September 16, 2013) at 8; Comments from the Wisconsin Department of Public Instruction, WC Docket No. 13-184 (September 16, 2013) at 4-5; Comments of Houston Independent School District, WC Docket No. 13-184 (September 13, 2013) at 2.
[33] EducationSuperHighway Reply Comments at 11.
[34] "A Vision for the Gigabit Future: Excerpts from the keynote address given at the 2013 *Broadband Communities* Summit by Milo Medin, vice president of access services for Google," *Broadband Communities Magazine*, May 2013, http://www.bbpmag.com/MuniPortal/EditorsChoice/0513editorschoice.php.

funding, but in the majority of cases fiber will be the best and most efficient option for schools

and libraries, and we urge the Commission to recognize this reality and prioritize investment

accordingly.

There are additional factors that can help schools and libraries predict and ensure

affordable service in the future. Locally or municipally-owned networks, where they exist, can

give communities much greater ability to plan for future costs, including how much schools and

libraries should expect to be charged for service in the future. Since 2010, E-rate has given

schools and libraries the flexibility to subscribe to services from non-traditional networks,

including municipal networks, in addition to the incumbent Eligible Telecommunications

Carriers that have traditionally received subsidies under the Universal Service Fund programs.[35]

For community anchor institutions, purchasing service from community-owned networks instead

of commercial alternatives can mean that they face less price fluctuation and may have an easier

time getting necessary upgrades.[36] Although shareholder revenue is important, locally-owned

networks tend to place a stronger emphasis on meeting customers' and institutions' connectivity

needs within the town or city, including building out to areas where it may take longer to see a

significant return on investment. By contrast, larger ISPs may be more inclined to continually

increase prices year after year and often have little incentive to upgrade aging networks in a

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[35] *Schools and Libraries Universal Service Support Mechanism*, CC Docket 02-6, GN Docket 09-51, Report and order, Federal Communications Commission, FCC 10-175, September 23, 2010 at 17.

[36] For example, a recent report by the Institute for Local Self Reliance highlights the benefits received by community anchor institutions after the local government in Scott County, Minnesota, invested in a 90 mile fiber ring in January 2007. According to the report: "The local school district has slashed its expenses, from paying approximately $58 per megabit to under $7 per megabit. And due to the network, the schools have almost unlimited capacity to upgrade to faster speeds that would have been cost prohibitive to lease from a telephone or cable company." (Christopher Mitchell and Lisa Gonzalez, "Minnesota Local Governments Advance Super Fast Internet Networks," Institute for Local Self-Reliance, March 19, 2014, http://www.ilsr.org/minnesota-local-governments-advance-super-fast-internet-networks/.)

timely manner, especially in rural or underserved areas where they may not have as many other customers.[37] A recent report from the Institute for Local Self Reliance (ILSR) on the Santa Monica City Network explains the benefits of community planning and investment in networks, noting that, "[c]ities that own their own equipment can budget for future upgrades and take advantage of technological advances that lower the cost of moving bits."[38]

In fact, schools around the country have yielded savings where they own their own infrastructure or partner with locally owned networks to build out high-speed connectivity or receive service at a reduced rate. The Weslaco Independent School District in southern Texas, for example, invested in "a private fiber-optic ring for [its] school district that is extremely cost effective."[39] According to their comments, "[i]n situations where the circumstances allow, installation of private fiber-optic cable, owned by the school district, could save millions of dollars annually." They add that without the investment, "we would not be able to provide the same level of connectivity to our schools that we are now able to provide."[40]

The Palo Alto Unified School District offers another example where it was ultimately cheaper and more effective to partner with the municipality to gain access existing fiber rings and to build additional infrastructure where needed to connect all of the schools in the area, rather than to continue leasing service from the incumbent ISP.[41] By investing in upgrades, the district can now confidently debut new digital resources and implement online assessments

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[37] *See,* e.g. Steve Early, "Broadband Redlining Targets Rural America," *The Nation,* May 14, 2007, http://www.thenation.com/article/broadband-redlining-targets-rural-america.
[38] Eric Lampland and Christopher Mitchell, "Santa Monica City Net: An Incremental Approach to Building a Fiber Optic Network," Institute for Local Self Reliance, March 2014 at 8, http://www.ilsr.org/santa-monica-city-net/.
[39] Weslaco Comments at 4.
[40] Weslaco Comments at 5.
[41] New America Foundation interview with Ann Dunkin, Director for Information Technology at the Palo Alto Unified School District, April 1, 2014.

without worrying about capacity constraints.[42] Pam Moran, school superintendent of Albemarle County, Virginia, explained recently how her district and the surrounding community have worked together to meet connectivity needs.[43] The Albemarle school district is a partner in the construction of over 100 miles of fiber optic cable to build a local network to connect schools and other county government sites. In addition, county schools have Wi-Fi hotspots, which are not only used by students and their parents, but are also coordinated with the local police force to help facilitate their communications. Moran noted these benefits can even extend beyond institutional walls to help connect students at home, particularly in remote parts of the county.

The Commission also asks if it "should authorize increased support for the recurring costs of broadband services over a period of time instead of, or in addition to, increased support for up-front costs, to the extent those recurring costs reflect time-limited recovery for capital investment."[44] We encourage the Commission to approach this issue with some flexibility, recognizing that even with an Upgrade Fund, some schools may need to amortize investments in new infrastructure over a period of several years depending on the size of the upfront investment and other relevant factors. The Commission should also consider what appropriate rules or safeguards need to be in place to ensure that increased recurring costs for network investment are directly related to the actual construction expenses and are reflected in faster service and lower rates going forward. It is important to ensure that the Commission's investment in high-speed

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[42] Diana Samuels, "Palo Alto School district to spend million in bond funds on technology," *San Jose Mercury News,* February 1, 2010, http://www.mercurynews.com/news/ci_14313254. Sharon Noguchi, "California Students' Verdict on New Tests: Tech is a breeze, content is tougher," *San Jose Mercury News*, March 28, 2014, http://www.mercurynews.com/education/ci_25445970/california-students-verdict-new-tests-tech-is-breeze.

[43] Remarks of Pam Moran, Superintendent of the Albemarle School District, at the New America Foundation, February 27, 2014, at 34:00-36:00, 105:00-106:00, http://education.newamerica.net/events/2014/connected_communities_in_digital_learning_age.

[44] E-rate Public Notice ¶29.

infrastructure does not become a means for service providers to collect additional fees from E-rate recipients for an indefinite period of time.

In response to the question of how to identify schools and libraries that should be eligible for deployment support,[45] we believe that the Upgrade Fund should be available to all applicants that demonstrate the need for network investments to obtain additional capacity, regardless of location or the discount level they currently receive for service. Since schools and libraries across the country—including those in rural, urban, and low-income areas—are struggling to meet their connectivity needs, it follows that they should all be eligible for one-time support to upgrade their networks, even if the precise level of support varies based on those other factors. The key consideration for projects that are eligible should be future scalability. In general, this would encompass the proposed target speeds since fiber infrastructure is really the only option that can support deployment of gigabit speeds and beyond in the future. Therefore, we urge the Commission to give preference, for example, to an applicant that proposed to upgrade to fiber infrastructure over upgrading cable networks to DOCSIS 3.0 standard, even if both applicants requested 100 Mbps connections.[46] While DOCSIS 3.0 has improved the capacity of cable networks, it still cannot support gigabit speeds. Moreover, retail business class cable connections typically do not offer the symmetrical speeds that would enable users to become not just consumers but also producers of content, as well as support high-definition video conferencing and distance learning tools. (Other technologies, such as DSL, satellite, and 3G/4G/LTE mobile services delivered are even less capable of meeting current capacity needs, let alone scaling for the future.) We encourage the Commission to develop thoughtful, objective criteria for the Upgrade Fund that will facilitate future-proof investments, but also to make sure it is

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[45] E-rate Public Notice ¶30.
[46] NAF Reply Comments at 8.

implemented in a way that does not unreasonably burden schools and libraries and could therefore discourage them from participating.

Assuming the initial $2 billion the Commission has identified is not sufficient to fund all of the necessary upgrades,[47] we urge the Commission to think about the first round of support as a beginning, and to approach it as an opportunity to learn more about the costs and challenges of funding these infrastructure upgrades, as well as to think about the long-term ability of the fund to support communications needs going forward. Chairman Wheeler and President Obama have referred to the initial money identified by the Commission as a "down payment" on better school and library connectivity for the future, indicating that they recognize it will likely be necessary to allocate additional funding to support the demands of E-rate modernization.[48] We agree that additional money will be needed not only to fully fund necessary fiber upgrades, but also so that E-rate can continue to support other vital services that schools and libraries require to facilitate 21st century learning. This expansion is consistent with calls for E-rate modernization made by Senator Rockefeller, Commissioner Rosenworcel, and former Chairman Hundt, all of whom have been integral to the creation and ongoing success of the E-rate program.[49]

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[47] E-rate Public Notice ¶31.

[48] Julian Hattem, "Obama Praises Down Payment on School Broadband," *The Hill,* January 28, 2014, http://thehill.com/blogs/hillicon-valley/technology/196766-obama-praises-down-payment-on-school-broadband. *See also* Sean Cavanagh, "FCC Chairman Vows to Build a Better E-rate Program," *Education Week*, February 5, 2014, http://blogs.edweek.org/edweek/DigitalEducation/2014/02/fcc_chairman_vows_to_create_a_.html.

[49] *See* Office of U.S. Congressman Jay Rockefeller. Rockefeller Calls for Major Expansion of E-rate Program, March 23, 2013, http://www.rockefeller.senate.gov/public/index.cfm/press-releases?ID=8e1e04d2-d4f0-4ae0-aab8-736a2f566ea9; Federal Communications Commission. Summary of Remarks of Commissioner Jessica Rosenworcel, Education Technology Policy Summit, April 11, 2013, http://www.fcc.gov/article/doc-320122a2; Remarks of Chairman Hundt at NAF.

For the initial projects, we urge the Commission to prioritize connectivity need, and to look for diversity in terms of institutional size, geographic location, demographics, and availability of residential broadband in the surrounding community. We also urge the Commission to prioritize proposals that demonstrate best practices around data collection and transparency that would promote comprehensive and nuanced analysis of successful E-rate projects. In fact, we recommend that as a condition of receiving support from the Commission in the initial round of the Upgrade Fund, applicants should agree to provide data about network planning, speeds, and costs that policymakers and researchers can analyze. The Commission may even consider allocating money for a study that would conduct a comprehensive analysis of what the full E-rate modernization process could require and what expected ongoing support would be needed going forward, based on both existing cost estimates and data from the initial round of Upgrade Fund projects.

C. The Commission should also consider changes to the existing priority system to support high-speed Wi-Fi and internal connections.

The Commission is correct in stating that in addition to broader capacity constraints, many schools and libraries are in dire need of upgrades to existing internal connections and require additional support for Wi-Fi equipment that will enable them to make the most of high-speed connections to the premises.[50] Although Priority 2 requests have far exceeded available funds for several years, FY 2014 was the first time that Priority 1 requests exceeded the size of the E-rate cap, leaving no money left to support Priority 2 technology, which includes internal

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[50] E-rate Public Notice ¶8,10.

connection equipment such as wiring, switches, and routers.[51] Clearly, the program must be restructured to ensure that Priority 2 requests for internal connections receive funding and to account for additional support needed on an ongoing basis.

As we noted in our initial comments in this proceeding, in addition to infrastructure investment to connect schools and libraries, E-rate recipients need flexibility to implement connectivity within and around the institutions themselves.[52] While we encourage the Commission to focus first on providing high capacity connectivity through a one-time Upgrade Fund, we recognize that the process of ensuring that schools and libraries have 21st century connectivity will not be complete until internal connections needs are also met. As such, the Commission should move wireless routers, switches, and other vital equipment for connectivity from Priority 2 to Priority 1 to make it easier for all E-rate recipients to get the necessary support for this technology. We believe that keeping this equipment within the existing priority system is also more appropriate than financing it through the Upgrade Fund, since the nature of the technology suggests that it will need to be replaced on a periodic basis. Ultimately, the most efficient use of E-rate funds will depend on a school or library's ability to utilize its bandwidth to distribute connectivity effectively in and around building walls. Improving access to hardware like wireless routers could also allow the communities surrounding schools and libraries to better utilize available connectivity.

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[51] The inflation-adjusted E-rate cap for E-rate in FY 2014 is $2.41 billion (*Announcement of E-rate Inflation-Based Cap for Funding Year 2014*, Federal Communications Commission, DA 14-426 (March 28, 2014)). As of March 27, 2014, USAC reported that it had received $2.643 billion in Priority 1 funding requests ("Update on Demand Estimate Preparation," Universal Service Administrative Company, March 27, 2014, http://usac.org/sl/tools/news/default.aspx).
[52] NAF Initial Comments at 7.

D. In the future, the Commission should also consider modernizing the ways in which it supports additional services such as privacy and security tools.

Lastly, as the Commission considers changes to the existing Priority system and phasing out support for certain legacy services,[53] we encourage it to consider the importance of privacy and security tools in addition to infrastructure that facilitates connectivity. Although we believe that it is appropriate right now to prioritize infrastructure and amplify support for internal connections, we urge the Commission to also look for ways to amplify support for security measures, many of which are currently eligible Priority 2 services but have not been a strong focus in this proceeding, and which now receive only the barest of financial support. Examples of these types of security measures might include "data protection" services[54] such as Virtual Private Networks and similar proxy tools. Making data security tools available to students, their families, and library patrons is critically important, especially in low-income areas where they are particularly vulnerable to privacy and surveillance concerns. We recommend combining good practice with sound digital literacy efforts supported through the Department of Education or other initiatives in order to maximize the effectiveness of these tools.[55]

III. Better data collection and transparency are critical to the success of a modernized E-rate.

The E-rate modernization process has revealed that the program suffers from a lack of useful data which can be analyzed by the Commission, researchers, and the public (including the

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[53] E-rate Public Notice ¶40.

[54] "Schools and Libraries Universal Support Mechanism: Eligible Services List," Universal Service Administrative Company, October 22, 2013, http://www.usac.org/_res/documents/sl/pdf/ESL_archive/EligibleServicesList-2014.pdf.

[55] Seeta Peña Gangadharan, "Knowing is Half the Battle: Combating Big Data's Dark Side Through Data Literacy" *Slate*, April 2, 2014, http://www.slate.com/blogs/future_tense/2014/04/02/white_house_big_data_and_privacy_review_we_need_federal_policy_about_digital.html.

applicant community) to better understand how E-rate money is being spent and what services and equipment schools and libraries are getting through this support. We therefore urge the Commission to improve its data collection practices and application process in order to produce more usable data, particularly with regard to speeds and prices.

A. The Commission should collect better data to support the proposed goal of maximizing cost-effective purchasing.

In our initial comments in this proceeding, we discussed the need for the Commission to collect better data from schools, libraries, and service providers in machine-readable formats that can be used to accurately measure progress and improve program evaluation.[56] The Commission asks once again in this Public Notice what data need to be collected to support the proposed goal of maximizing cost-effective purchasing, and, specifically, whether "price transparency for E-rate supported services will help drive down those prices."[57] We believe better data collection is critical to successful E-rate modernization, and that increased transparency would be beneficial to the applicant community and the program as a whole. As EducationSuperHighway notes in its Reply Comments, "in order to further improve program efficiency, there is widespread agreement [in the docket] that the Commission should collect and release more data about existing network infrastructure, the percentage of a school's broadband capacity that is currently being utilized, and the costs of E-rate services."[58] They further highlight that, with the exception of service providers whose financial interests provide a reason to oppose transparency, "there is widespread agreement among commenters that the Commission should release and make searchable currently collected E-rate application information, including Form 471 Item 21

[56] NAF Initial Comments at 17.
[57] E-rate Public Notice ¶37,
[58] EducationSuperHighway Reply Comments at 7.

attachments. Similarly, there is broad support for increasing transparency in pricing and for collecting more meaningful data about broadband capacity."[59] Our proposals for improved data collection processes, especially around broadband speeds and pricing information, reflect this shared understanding.

i. *Speed Data*

First, the Commission should work with the Universal Service Administrative Company (USAC) to collect better broadband speed information, which will provide a much clearer picture of the current state of connectivity at schools and libraries across the country. These data can be collected in varying levels of granularity. As a simple initial step, the Commission could ensure that it has accurate and well-organized data on the advertised speeds that schools and libraries are purchasing, which would give information about the maximum level of connectivity at each institution. Form 470 and Form 471 already request these data in some form, but as other commenters have pointed out[60] and we explain further in the next section, the Commission can make improvements to these forms and the application process that will improve the usability of the collected information on a large scale. In addition, the Commission should take steps to increase its understanding of the real world speeds that schools and libraries receive,[61] a valuable supplementary dataset to advertised speeds which can, among other things, help identify problematic cases where the difference between the maximum and actual speeds is significant.

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[59] EducationSuperHighway Reply Comments at 7.
[60] Reply Comments of the American Library Association (ALA), W.C. Docket No. 13-184 (November 7, 2013) at 12, http://apps.fcc.gov/ecfs/document/view?id=7520956700.
[61] Google Reply Comments at 9-10.

The Commission can encourage schools and libraries to utilize simple speed tests[62] to conduct initial assessments of whether current actual speeds conform to expected speeds. However, we encourage the Commission to look for ways to institutionalize automated, premise-level collection of network performance data on an ongoing basis. Tools to measure Internet performance, such as one called BISMark, which runs over Measurement Lab (M-Lab), allow users "to measure Internet performance continuously over time."[63] Researchers are currently investigating its use in the context of premise level, automated monitoring at community anchor institutions, and as the technology continues to evolve, we urge the Commission to look into implementing the technology across schools and libraries receiving E-rate funding. Automated collection of speed and network performance data would produce a more detailed and useful dataset, and help schools, libraries, and the Commission better understand whether the actual performance conforms to expected performance. The Commission's Digital Textbook Playbook suggests that this type of performance data would greatly improve schools' ability to plan their networks and identify when upgrades are needed.[64] Direct router data can similarly make it easier to understand if school and library networks are configured properly to maximize the capacity they have purchased, and to identify more precisely where the problem spots in the network may be. A focus on data transparency will ultimately facilitate the ability of the E-rate program to meet the needs of recipients and the public.

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[62] Examples of existing tools include OOKLA's Speedtest, available at http://www.speedtest.net/.

[63] "Measurement Lab Introduces New, Hardware-Based Tool," *Google Public Policy Blog*, http://googlepublicpolicy.blogspot.com/2011/07/measurement-lab-introduces-newhardware.html (July 19, 2011). Measurement Lab is a consortium of research, industry, and public interest partners dedicated to providing an ecosystem for the open, verifiable measurement of global network performance. It was founded by New America's Open Technology Institute, the PlanetLab Consortium, Google Inc. and academic researchers. (For more information, *see* "About Measurement Lab," http://www.measurementlab.net/about.)

[64] FCC's Digital Textbook Playbook at 16-18.

ii. Pricing Data

Information on network performance alone is not enough, however. We reiterate our previous comments that the Commission must collect better pricing information, at the very least so that policymakers can understand the services being purchased with E-rate funds and track progress in terms of cost savings and other improvements in the coming years. Moreover, we encourage the Commission to make this information available to the applicant community to enable better enforcement of program rules such as the Lowest Corresponding Price rule, as well as to researchers to study and evaluate the program and the degree to which anchor institutions are connected to affordable broadband.[65] Although some commenters expressed concern about releasing proprietary or sensitive information collected through the E-rate program, resources such as the Sunlight Foundation's Open Data Policy Guidelines can help inform best practices around making these data available.[66] We are confident that such data will help applicants better understand the service they are receiving and hold service providers accountable when they violate the rules of the program.[67] Increased levels of understanding and accountability could lead to significant cost savings for the E-rate program, helping to ensure that program recipients do not overpay for services.[68]

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[65] Danielle Kehl, "Show Us the Data: Better Information Collection for a Better E-rate," New America Ed Central, February 24, 2014, http://www.edcentral.org/show_us_the_e-rate_data/.
[66] *See* #5, 7, 8, 15 in "The Sunlight Foundation's Open Data Policy Guidelines, Version 3.0," The Sunlight Foundation, March 18, 2014, http://sunlightfoundation.com/opendataguidelines/.
[67] *See* Reply Comments of the Benton Foundation, WC Docket No. 13-184 (November 8, 2013) at 8-9.
[68] LEAD Reply Comments at 11.

B. The Commission should make changes to the E-rate application to streamline the process and produce more structured, usable data.

The Commission also asks about simple changes that can be made to the E-rate application to streamline the administrative processes.[69] The Commission should approach this issue by considering two distinct questions—one about process (i.e. how the Commission is collecting data) and one about content (i.e. what data the Commission is collecting and from whom)—and find ways to improve both sides of the equation. A streamlined and improved application form will directly contribute to a better understanding of the program as it currently exists and to improvements to the program in the future. To that end, the Commission should think about three related questions: (1) what information is the Commission collecting now that could be improved? (2) What is the Commission *not* currently asking for that it should be collecting? And (3) what data should be required or described more specifically in order to improve its usefulness?

First and foremost, the Commission should move toward a streamlined application process and an electronic filing system that would easily allow applicants to access information that they have already submitted in the current funding cycle as well as in previous years. For applicants, a simple electronic filing system would eliminate unnecessary paperwork and improve the consistency and accuracy of the data they provide to the Commission. E-filing would also make it easier for the Commission to aggregate and publicly release data such as the Form 471 Block 4 data, which the Commission has already made available for FY 2010.[70] Wherever possible, the Commission should also encourage applicants to submit the Item 21 attachment electronically, since this form contains vital information about services and prices

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[69] E-rate Public Notice ¶38.
[70] "FCC Releases Machine Readable Data on E-rate Program," FCC Official Blog, October 19, 2012, http://www.fcc.gov/blog/fcc-releases-machine-readable-data-e-rate-program.

that could help the Commission better evaluate the program. It is possible that this change will require USAC to upgrade or replace its existing systems, but if true, the Commission should make that investment sooner rather than later because it will ultimately be needed in the long run. Using better tools can improve E-rate outcomes and increase efficiency by enhancing our understanding of how program dollars are being spent and on what equipment and services. A simpler application process could also reduce schools' and libraries' reliance on E-rate consultants to navigate the complex forms and requirements, freeing up more money to spend on services and equipment.

Transitioning to electronic filing and other small adjustments to the information that the Commission is currently collecting would yield significant benefits for the program. Although the Commission already makes changes as needed to Forms 470, 471, and 486, it does not appear to have made many systematic improvements to the application process itself. We therefore urge the Commission to work with USAC to ensure that information is collected in a way that leads to machine-readable, structured data that can be analyzed and compared to previous years, and that does not require substantial work to refine for analysis. Fewer narrative answers and open form fields would also significantly improve the consistency and utility of the information collected on the forms. For example, on Form 470 Block 2 ("Description of Needs/Services Requested") the Commission could provide a series of standard answers and ranges for "service" and "quantity and/or capacity" and could collect similarly structured information on Form 471 to reflect what schools actually end up purchasing from ISPs. The Commission can leave blank space for applicants to provide additional context or information where necessary, but wherever possible it should reduce reliance on open form fields in favor of consistent, standardized, and understandable options.

Similarly, the Commission should also conduct a review of all the E-rate forms and instructions to ensure that there is parity in what is being collected at each point in the application process. Doing so will not only improve accuracy but also may increase our understanding of the program overall. For example, better data which compare what services schools and libraries request on Form 470 in comparison to what they choose at the conclusion of the competitive bidding process could yield interesting insights about the bandwidth schools and libraries believe they need in comparison to what is available and what they can afford. As we have emphasized,[71] it is also important that the Commission collect specific pricing data about the cost per megabit for services purchased through the E-rate program. These data will provide a picture of the state of broadband connectivity at schools and libraries today more clearly than what can currently be accomplished through survey data, and will also provide the basic information needed to incentivize efficiency and ensure compliance with the rules of the program.

Finally, the Commission should consider what information is not required on the existing forms but should be in order to produce a more complete and uniform dataset. For example, it would not be difficult to require that schools and libraries list all of their National Center for Education Statistics (NCES) and Federal-State Cooperative System (FSCS) codes with as much detail as possible. This would help maximize compatibility between E-rate data and other existing databases on schools and libraries. The information collected from service providers through Form 486 could also be improved and adjusted, and could even reduce or eliminate the need to collect certain information from the schools and libraries themselves.

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[71] NAF Initial Comments at 17-26; NAF Reply Comments at 17-24.

We urge the Commission to work with USAC and to draw upon other data resources within the Federal government to update and improve the E-rate application process. The White House's Open Data Policy[72] and resources created through the broader Open Data Initiative[73] can be instructive, as can other federal agencies that collect and manage large amounts of information. Non-governmental organizations like the Sunlight Foundation can also be valuable in this regard.

IV. Conclusion

E-rate modernization efforts should ensure that all students, families, and community members have access to educational resources that enable them to develop 21st century skills. We support the Commission in its efforts to update the program to focus on meeting the growing high-speed connectivity needs of schools and libraries. For the reasons outlined above, we believe that these goals will be best achieved by prioritizing investments in high-capacity infrastructure upgrades, restructuring the existing priority system to support internal connections and related needs, and emphasizing better data collection and transparency across the program as a whole.

Respectfully Submitted,

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[72] "Open Data Policy—Managing Information as an Asset," Executive Office of the President, Office of Management and Budget, May 9, 2013, http://www.whitehouse.gov/sites/default/files/omb/memoranda/2013/m-13-13.pdf.
[73] "Open Government Initiative," The White House, http://www.whitehouse.gov/open.